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## EFFECT OF SUN DRYING CATTLE HIDES ON THE QUALITY OF CHROME UPPER LEATHER

J. K. KHANNA, S. C. NANDY & Y. NAYUDAMMA  
*Central Leather Research Institute, Madras*

The qualities of chrome upper leathers produced from flint dried, frame dried and dry salted sides of cattle hides are compared with those of the corresponding wet salted sides. Of the different methods of drying, suspension drying on frame has produced the best quality raw stock and the upper leathers produced from such sides are comparable to those from wet salted sides. Flint dried sides produced by conventional method are found severely damaged during processing. The quality of dry hides may however be improved by frame drying with specific measures during drying. Tensile strength of the leathers is slightly affected by flint drying; other physical properties remain practically unaffected by different methods of drying.

### Introduction

Drying of hides and skins in the sun or shade is the simplest and most economic method of curing. The merits (e.g., longer preservation and light weight) and demerits (e.g., difficulty in rehydration, insect damage during storage and quality assessment) of drying have been well recognised by tanners and technologists. On account of these associated problems tanners do not generally prefer dry hides. Rehydration of dry hides may appreciably be improved by using modern techniques of drying<sup>1, 2</sup> and different soaking agents. Insect damage during storage may also be controlled or reduced by treatment with effective insecticides. Data on comparative leather making properties of the dry and wet salted hides are<sup>3</sup> however

limited. In a previous study<sup>3</sup> with dry hides from fallen animals in Rajasthan, it was observed that the hides are very poor in quality and most of them not suitable for full chrome shoe upper leather. Further studies have been carried out on dry hides to obtain information on the qualities of leathers from such dry hides.

### Materials and methods

Slaughtered cattle hides were collected from Madras slaughter house in the afternoon. Each hide was cut into two sides and weighed. The left sides were wet salted in the evening and considered as control sides. The right sides were cured in three different ways: (i) flint drying, (ii) suspension drying on frame and (iii) dry salting.

### *Flint drying*

Flint drying was done in three different methods. Six sides were taken in the first experiment and kept in hide cellar (10°C) in the evening. Next morning, they were spread over the wooden platforms placed on the ground and exposed to the sun flesh side up for drying. The temperature variation throughout the day ranged between 41 and 29°C. The sides were dried consecutively for the second and third days and stored for one month.

In the second experiment three sides were spread over the wooden platforms in the same evening. They were dried in the shade for three days.

Three sides were taken in the third experiment and were kept in hide cellar overnight. Next morning, they were green fleshed, spread over wooden lattice platforms, kept in slant positions and dried in the shade. In the evening the sides dried incompletely were kept in the hide cellar to prevent any bacterial degradation. Next day, they were dried as before in shade and kept in the hide cellar in the evening. On the third day, the sides were completely dried.

### *Suspension drying on frame*

Six sides were stored in the hide cellar in the evening. Next morning, they were framed on wooden frames by tying the edges with rope through cut holes. They were then stretched uniformly under light tension. The frames were placed slantly in east-west direction under open sun at a temperature range 41-29°C. The sides were dried in about two days' time.

### *Dry Salting*

Six experimental sides were salted with common salt in the usual way. After three days, the sides were nailed on wooden boards and kept in the sun at an inclination to sun rays. They were then dried for three days.

### *Processing*

Flint dried and frame dried sides were soaked overnight in water. Next day, they were resoaked in a pit containing 0.125% sulphuric acid and 3% salt (on volume of water) and 0.05% sodium trichlorophenate. On the third day, the sides were taken out, broken over the beam and put to a fresh soaking bath of the same composition. On the fourth day, they were taken out and limed for two days using 2.25% sodium sulphide, 0.5% ammonium sulphate, 3% slaked lime and 300-350% water. The sides were finished into full chrome upper leather following a standard procedure.

Dry salted sides were soaked in water in the morning. Next day, they were broken over the beam and left in a pit containing 0.05% TritonX 100 and 0.05% sodium trichlorophenate (on volume of water). Next day afternoon, they were taken for liming.

The wet salted sides were soaked for about 4 hours, washed and limed as usual along with the experimental sides.

*Observations:* It was found that flint dried sides took more time for soaking than the frame dried and dry salted sides. Even after 4 days' soaking, some regions of flint dried sides were under-soaked. After soaking and specially

**Table 1**  
**TANNERY YIELDS OF THE SIDES DRIED IN DIFFERENT WAYS**  
 (YIELD CALCULATED AS % ON GREEN WEIGHT)

Type of cure	Experimental			Control		
	Dry wt.	Soaked wt.	Pelt wt.	Wet salted wt.	Soaked wt.	Pelt wt.
Flint dry*	33.05	84.95	76.69	79.36	100.21	78.29
Frame dry**	32.65	82.14	78.06	76.00	91.00	76.50
Dry salted**	50.47	84.43	79.25	67.43	95.87	81.65

\* Average of 12 sides

\*\* Average of 6 sides

after liming, it was observed that flint dried sides were damaged due to putrefaction in regions which remained hard after soaking and also in other areas. In few cases the damage was severe and the sides were unsuitable for finishing.

### Results and discussion

Tannery yields of flint dried, frame dried and dry salted sides along with the corresponding wet salted sides (control) were noted during processing and are given in Table 1. Assessment of the leathers for quality by visual inspection and the area yield are presented in Table 2. Physical properties of the finished leathers are given in Table 3.

In the present study the leather making properties of flint dried, suspension dried and dry salted sides are compared with those of corresponding wet salted sides. Although drying of hides appears to be very simple, it is indeed difficult to do so in all places and in different seasons. Hence the success of drying method depends on environmental conditions. Experimental dry hides are stored only for a period of 1-2 months under

careful observation and thus kept free from any insect damage. Proper care is taken during the soaking of dry and dry salted sides; still after soaking the dry sides are found much less soaked than the control wet salted sides (Table 1). After liming, however, there is not much difference in pelt weight between experimental and control sides.

An analysis of Table 2 reveals the efficiency of different procedures for drying. Sides flint dried in hot sun (first experiment) have produced very poor quality leathers as all the sides are found to be damaged severely due to blisters and putrefaction. Fig. 1 re-

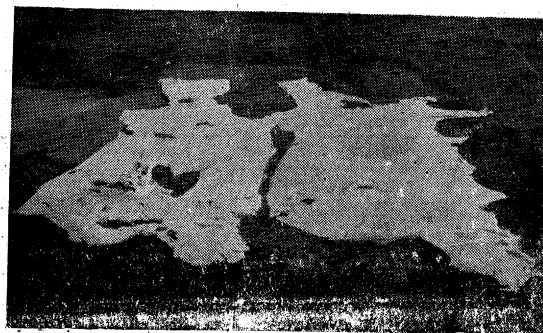


FIG. 1. Condition of flint dried hide after liming

**Table 2**  
**ASSESSMENT OF QUALITY AND AREA YIELD OF LEATHER OBTAINED**  
**FROM HIDES CURED BY DIFFERENT METHODS**

Type of cure	Experimental Gradation				Area yield (sq.ft./lb. of green hide)	Type of cure	Control Gradation				Area yield (sq.ft./lb. of green hide)
	Prime	Second	Third	Rejection			Prime	Second	Third	Rejection	
<i>Flint dry</i>						<i>Wet salted</i>					
Expt. I	—	—	1	5	0.90	1	5	—	—	1.0	
Expt. II	—	—	2	1	0.68	1	2	—	—	0.76	
Expt. III	—	2	1	—	1.0	—	2	1	—	1.10	
Frame dry	2	3	1	—	0.97	2	3	1	—	0.94	
Dry salted	—	2	4	—	0.94	—	4	2	—	0.99	

presents two such damaged sides after liming. Flint drying at high temperatures has resulted in such poorly cured stock. Leathers obtained from sides left at room temperature (28-30°C) throughout the night and dried next day in shade (second experiment) are also damaged considerably. Overnight post-mortem delay and slow drying in the shade are probably responsible for bacterial degradation of the sides. Leathers produced from flint dried sides dried by the improved procedure (third experiment) are found rather comparable to those of control wet salted sides. Green fleshing, keeping overnight at a lower temperature (10°C) and shade drying allowing free passage of air have made this considerable improvement in the quality of dry stock. Frame drying even at a very high temperature (same as in first experiment) has produced well cured sides; when converted into leather they are found to be of same grade like those of control sides. Con-

trol leathers however, appear to be slightly more full than experimental leathers. This very clearly shows the superiority of frame drying method over that of flint drying.

Leathers produced from dry salted sides are found to be slightly inferior to control leathers. This difference may be due to the nailing of sides on wooden boards during drying and no air circulation on both sides. In another study it has been noted that dry salting in frame gives well cured hide and the leather produced from it is comparable to control leather.

Area yield of leather (per lb. of raw hide) is slightly less in case of flint dried and dry salted sides, but slightly more in frame dried sides than those of the corresponding control leathers. Variation in area yield does not exist when leathers from frame dried hides are trimmed.

Table 3

PHYSICAL PROPERTIES OF THE LEATHERS FROM HIDES CURED BY DIFFERENT METHODS

Type of cure	Tensile strength (lb./sq.in.)		Elongation %		Stitch tear strength (lb./in.)		Tongue tear strength (lb./in.)		Grain cracking strength (lb./sq. in./in.)	Bursting strength (lb./sq. in./in.)
	⊥	∥	⊥	∥	⊥	∥	⊥	∥		
Flint dry*	3031	2690	47.0	43.0	1454	1294	309	306	8817	11494
Control	3376	3440	41.0	47.0	1466	1453	330	345	7571	11974
Frame dry**	4618	3731	50.0	44.0	1347	1503	290	317	10012	13700
Control	4781	3958	44.0	44.0	1322	1422	313	310	8844	12809
Dry salted**	4280	3435	51.0	45.0	1553	1455	329	302	10188	13705
Control	4057	3469	41.0	46.0	1519	1358	345	330	9827	12585

\* Average of 12 sides

\*\* Average of 6 sides

It is apparent from Table 3 that tensile strength of the leathers from flint dried sides is somewhat lower than corresponding leathers. Other properties viz., stitch tear strength, tongue tear strength, grain cracking strength and bursting strength remain practically unaffected. No significant difference in physical properties is noticeable between the leathers from experimental frame dried and dry salted sides and the corresponding control leathers.

The following factors play significant role in the proper drying of hides: (i) temperature and humidity existing during drying, (ii) post-mortem period, (iii) fatty and adipose tissue layer and (iv) free circulation of air on both sides. To produce a good dry hide, proper considerations should be given to all these aspects; otherwise it would be bet-

ter to cure the hides and particularly the fallen hides by dry salting or wet salting. In case it is not intended to store the hides for a considerably longer period, hides may better be cured in India by wet salting method.

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